# Complete Summary

## GUIDELINE TITLE

ACR Appropriateness Criteria® mesenteric ischemia.

## BIBLIOGRAPHIC SOURCE(S)

Gemery JM, Funaki BS, Ray CE Jr, Brown DB, Kinney TB, Kostelic JK, Lorenz JM, Milward SF, Nemcek AA Jr, Owens CA, Reinhart RD, Silberzweig JE, Siskin GP, Vatakencherry G, Moneta GL, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 4 p. [11 references]

## GUIDELINE STATUS

This is the current release of the guideline.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

## COMPLETE SUMMARY CONTENT



## SCOPE

### DISEASE/CONDITION(S)

- Acute nonocclusive mesenteric ischemia
- Acute occlusive mesenteric ischemia
- Chronic mesenteric ischemia
- Median arcuate ligament syndrome

### GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

## CLINICAL SPECIALTY

Emergency Medicine
Gastroenterology
Geriatrics
Internal Medicine
Radiology
Surgery

## INTENDED USERS

Health Plans
Hospitals
Managed Care Organizations
Physicians
Utilization Management

## GUIDELINE OBJECTIVE(S)

To evaluate the appropriateness of radiologic examinations and therapeutic procedures for patients with mesenteric ischemia

## TARGET POPULATION

Patients with mesenteric ischemia

## INTERVENTIONS AND PRACTICES CONSIDERED

### Diagnosis/Evaluation

1. Computed tomography angiography
2. Magnetic resonance angiography
3. Ultrasound
4. Mesenteric angiography in select patients

### Management/Treatment

1. Anticoagulation
2. Angiography with infusion of vasodilator
3. Angiography and transcatheter lytic therapy
4. Angioplasty and stent placement
5. Surgery
    - With bypass or endarterectomy
    - With median arcuate ligament release, with or without bypass
6. Supportive measures only

### MAJOR OUTCOMES CONSIDERED

- Utility of radiologic examinations in differential diagnosis
- Effectiveness of treatment

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The guideline developer performed literature searches of peer-reviewed medical journals and the major applicable articles were identified and collected.

### NUMBER OF SOURCE DOCUMENTS

Not stated

### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Not Given)

### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not stated

### METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

One or two topic leaders within a panel assume the responsibility of developing an evidence table for each clinical condition, based on analysis of the current literature. These tables serve as a basis for developing a narrative specific to each clinical condition.

### METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Delphi)

### DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Since data available from existing scientific studies are usually insufficient for meta-analysis, broad-based consensus techniques are needed for reaching

agreement in the formulation of the appropriateness criteria. The American College of Radiology (ACR) Appropriateness Criteria panels use a modified Delphi technique to arrive at consensus. Serial surveys are conducted by distributing questionnaires to consolidate expert opinions within each panel. These questionnaires are distributed to the participants along with the evidence table and narrative as developed by the topic leader(s). Questionnaires are completed by participants in their own professional setting without influence of the other members. Voting is conducted using a scoring system from 1-9, indicating the least to the most appropriate imaging examination or therapeutic procedure. The survey results are collected, tabulated in anonymous fashion, and redistributed after each round. A maximum of three rounds is conducted and opinions are unified to the highest degree possible. Eighty percent agreement is considered a consensus. This modified Delphi technique enables individual, unbiased expression, is economical, easy to understand, and relatively simple to conduct.

If consensus cannot be reached by the Delphi technique, the panel is convened and group consensus techniques are utilized. The strengths and weaknesses of each test or procedure are discussed and consensus reached whenever possible. If "No consensus" appears in the rating column, reasons for this decision are added to the comment sections.

### RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

### COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

### METHOD OF GUIDELINE VALIDATION

Internal Peer Review

### DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Criteria developed by the Expert Panels are reviewed by the American College of Radiology (ACR) Committee on Appropriateness Criteria.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

**ACR Appropriateness Criteria®**

**Clinical Condition: Mesenteric Ischemia**

**Variant 1: Elderly patient with recent onset abdominal pain, no peritoneal signs, known atrial fibrillation. CT scan shows filling defect in proximal superior mesenteric artery (SMA) consistent with thrombus.**

| Treatment/Procedure | Rating | Comments |
|---|---|---|
| Anticoagulation | 9 | |
| Surgery | 8 | |
| Angiography and transcatheter lytic therapy | 4 | Contraindicated for bowel infarction. |
| Supportive measures only | 2 | |
| **Rating Scale: 1=Least appropriate, 9=Most appropriate** | | |

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

**Variant 2: Elderly patient with history of abdominal pain after meals for the past few months and weight loss. CT scan of the abdomen shows aortic atherosclerotic disease and suggests SMA origin stenosis with possible severe stenosis versus occlusion of celiac origin, plus an occluded inferior mesenteric artery (IMA).**

| Treatment/Procedure | Rating | Comments |
|---|---|---|
| Angiography with possible angioplasty and stent placement | 8 | Less durable but better risk profile. Failure does not preclude surgery. |
| Surgery with bypass or endarterectomy | 7 | Appropriate in select patients. No longer the standard of care. |
| Anticoagulation | 3 | |
| Supportive measures only | 2 | Some patients may be poor candidates for revascularization procedures. |
| **Rating Scale: 1=Least appropriate, 9=Most appropriate** | | |

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

**Variant 3: Middle-aged patient (40-60 years of age) with pain after meals and CT scan showing widely patent origins of SMA and IMA, with possible compression of the celiac origin by the median arcuate ligament.**

| Treatment/Procedure | Rating | Comments |
|---|---|---|
| Mesenteric angiography in lateral projection | 8 | Gold standard, but would try CTA or MRA first and reserve angiography for select |

| Treatment/Procedure | Rating | Comments |
|---|---|---|
| during both inspiration and expiration | | patients. |
| Surgery with median arcuate ligament release, with or without bypass | 8 | Has been reported to improve symptoms, but other possible causes of abdominal pain should be ruled out first. |
| Supportive measures only | 5 | Controversial entity. Need to rule out other possible causes of abdominal pain. |
| Anticoagulation | 1 | |
| Angioplasty and stent placement | 1 | |
| **Rating Scale: 1=Least appropriate, 9=Most appropriate** | | |

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

**Variant 4: Hospitalized patient with cardiac disease causing low cardiac output, on lasix. Now with abdominal pain but without peritoneal signs. CT scan shows patent origins and proximal portions of celiac, SMA, and IMA, with some thickening of small bowel walls.**

| Treatment/Procedure | Rating | Comments |
|---|---|---|
| Angiography with infusion of vasodilator | 8 | Early initiation of vasodilator therapy is best. |
| Anticoagulation | 5 | Theoretically useful, but no data. |
| Supportive measures only | 3 | Appropriate when used in conjunction with other therapy. |
| Surgery | 2 | Appropriate for resection of infarcted bowel. |
| **Rating Scale: 1=Least appropriate, 9=Most appropriate** | | |

Note: Abbreviations used in the tables are listed at the end of the "Major Recommendations" field.

**Summary of Literature Review**

**Diagnosis of Mesenteric Occlusive Disease**

Detection of proximal mesenteric arterial occlusive disease is possible with computed tomography (CT), magnetic resonance angiography (MRA), and

ultrasound (US). Ostial lesions are reliably evaluated with all three modalities. Both US and MRA have been directly compared with angiography. Multidetector CT scanners, particularly with sagittal reformatting, are capable of demonstrating the proximal mesenteric vessels very well. CT relies on administration of iodinated contrast but does not entail the risks of angiography.

In a patient with renal insufficiency or a history of severe reaction to iodinated contrast, US of the mesenteric vessels origins is preferred over CT. Results will vary considerably with operator expertise, patient body habitus, and presence of bowel gas, but accuracy in detecting ostial abnormality has been reported to be greater than 90%. The more peripheral mesenteric vessels are not as well demonstrated with US or CT scanning, and angiography has remained the best method to evaluate these vessels. Therefore, if clinical suspicion of mesenteric ischemia is high, a negative CT or US exam should not preclude selective mesenteric angiography, particularly if distal disease is a consideration.

**Acute Nonocclusive Mesenteric Ischemia**

In a patient with signs and symptoms of acute mesenteric ischemia, narrowing of peripheral mesenteric vessels or a pattern of alternating dilatation and narrowing suggests nonocclusive mesenteric ischemia. This diagnosis is best made with conventional angiography, which would also enable initiation of catheter-directed vasodilator infusion therapy. Angiography can provide diagnostic information not available from CT or US. Vasoconstriction may lead to bowel ischemia and necrosis with a mortality rate that has been reported to be 50%. Because early diagnosis and treatment are critically important in acute mesenteric ischemia to avoid bowel infarction, if an angiogram can be obtained rapidly it may be preferable to any delay associated with obtaining noninvasive imaging.

**Acute Occlusive Mesenteric Ischemia**

Thrombolysis for treatment of mesenteric thrombosis or embolus has been reported. While it is technically feasible and in many reported cases successful, a recent review article identified published reports of thrombolytic therapy covering only a total of 43 patients. Thrombolysis could be applied in only a minority of patients presenting with acute mesenteric ischemia. Thrombolysis is contraindicated in bowel infarction, and any indication of bowel infarction (peritoneal symptoms, pneumoperitoneum, or intramural air on CT) is an indication for urgent surgery rather than thrombolysis. The inability to confidently exclude bowel infarction in many patients with mesenteric ischemia has limited widespread use of thrombolysis. Due to the presence of vasospasm associated with occlusive mesenteric ischemia, catheter-directed vasodilator infusion may also be of benefit in some patients with occlusive mesenteric ischemia, especially prior to more definitive therapy.

**Chronic Mesenteric Ischemia**

Chronic mesenteric ischemia most commonly occurs due to atherosclerotic occlusive disease of the mesenteric arteries (celiac axis, superior mesenteric artery, inferior mesenteric artery). Signs and symptoms of chronic mesenteric ischemia include weight loss, sitophobia (food fear), and abdominal pain after eating. Given the relatively rich collateral supply to bowel, signs and symptoms of

ischemia typically occur when at least two arteries (and often all three) are affected. Endovascular therapy, particularly angioplasty and stenting, has supplanted open surgical repair as the preferred therapy for mesenteric origin stenoses in patients without bowel infarction. Mortality and morbidity are believed to be lower for endovascular interventions compared to open repair.

**Median Arcuate Ligament Syndrome**

The median arcuate ligament is a fibrous band connecting the right and left hemidiaphragms and is found in up to 20% of the population. The incidence, and even existence, of abdominal symptoms due to compression of the celiac artery by the median arcuate ligament is debatable. The compression has been postulated to limit blood flow to bowel with resulting ischemic symptoms or to irritate the celiac ganglion, which results in abdominal pain. Compression of the celiac artery may be a normal finding in asymptomatic patients and is well characterized.

Patients with imaging evidence of celiac axis compression have been treated with best results in patients who had both celiac decompression (surgical division of the ligament) and some form of celiac artery revascularization. Predictors for successful outcome were "postprandial pain pattern (81% cured), age between 40 and 60 (77% cured), and weight loss of 20 pounds or more (67% cured)". There is no current evidence that supports use of angioplasty and stenting in this entity, and endovascular dilation may be contraindicated unless ligament release has been performed first.

**Summary**

- Noninvasive tests such as CTA, MRA, or US should be the initial diagnostic imaging tests of choice for evaluating chronic mesenteric ischemia. These modalities can reliably diagnose proximal occlusive disease. Conventional angiography is reserved for diagnosis of distal disease or performed concurrently with endovascular treatment.
- Angioplasty and stent insertion have shown promising results in treating chronic mesenteric ischemia due to proximal mesenteric occlusive disease and are considerably less invasive than open surgical bypass.
- Because rapid diagnosis and treatment are mandatory in acute mesenteric ischemia, if clinical suspicion is high, conventional angiography is the best overall modality for diagnosis, particularly if it can be obtained with minimal delay.
- Thrombolysis for acute occlusive mesenteric ischemia is predicated on an ability to confidently exclude bowel infarction.
- Patients with acute nonocclusive mesenteric ischemia may benefit from catheter-directed intra-arterial vasodilator infusion. Some patients with acute occlusive mesenteric ischemia may also benefit from vasodilator infusion prior to more definitive therapy.

**Abbreviations**

- CT, computed tomography
- CTA, computed tomography angiography
- IMA, inferior mesenteric artery

- MRA, magnetic resonance angiography
- SMA, superior mesenteric artery

### CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations are based on analysis of the current literature and expert panel consensus.

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

- Selection of appropriate radiologic imaging and treatment procedures for patients with mesenteric ischemia
- Early diagnosis and treatment of acute mesenteric ischemia may help prevent bowel infarction.

### POTENTIAL HARMS

Mortality and morbidity are believed to be lower for endovascular interventions compared to open repair.

## CONTRAINDICATIONS

### CONTRAINDICATIONS

- Angiography and transcatheter lytic therapy are contraindicated in bowel infarction. Thrombolysis is also contraindicated in bowel infarction, and any indication of bowel infarction (peritoneal symptoms, pneumoperitoneum, or intramural air on CT) is an indication for urgent surgery rather than thrombolysis
- There is no current evidence that supports use of angioplasty and stenting for median arcuate ligament syndrome, and endovascular dilation may be contraindicated unless ligament release has been performed first

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

An American College of Radiology (ACR) Committee on Appropriateness Criteria and its expert panels have developed criteria for determining appropriate imaging examinations for diagnosis and treatment of specified medical condition(s). These criteria are intended to guide radiologists, radiation oncologists, and referring

physicians in making decisions regarding radiologic imaging and treatment. Generally, the complexity and severity of a patient's clinical condition should dictate the selection of appropriate imaging procedures or treatments. Only those exams generally used for evaluation of the patient's condition are ranked. Other imaging studies necessary to evaluate other co-existent diseases or other medical consequences of this condition are not considered in this document. The availability of equipment or personnel may influence the selection of appropriate imaging procedures or treatments. Imaging techniques classified as investigational by the U.S. Food and Drug Administration (FDA) have not been considered in developing these criteria; however, study of new equipment and applications should be encouraged. The ultimate decision regarding the appropriateness of any specific radiologic examination or treatment must be made by the referring physician and radiologist in light of all the circumstances presented in an individual examination.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

### IMPLEMENTATION TOOLS

Personal Digital Assistant (PDA) Downloads

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Getting Better

### IOM DOMAIN

Effectiveness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Gemery JM, Funaki BS, Ray CE Jr, Brown DB, Kinney TB, Kostelic JK, Lorenz JM, Milward SF, Nemcek AA Jr, Owens CA, Reinhart RD, Silberzweig JE, Siskin GP, Vatakencherry G, Moneta GL, Expert Panel on Interventional Radiology. ACR Appropriateness Criteria® mesenteric ischemia. [online publication]. Reston (VA): American College of Radiology (ACR); 2008. 4 p. [11 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

## DATE RELEASED

2008

## GUIDELINE DEVELOPER(S)

American College of Radiology - Medical Specialty Society

## SOURCE(S) OF FUNDING

The American College of Radiology (ACR) provided the funding and the resources for these ACR Appropriateness Criteria®.

## GUIDELINE COMMITTEE

Committee on Appropriateness Criteria, Expert Panel on Interventional Radiology

## COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

*Panel Members*: John M. Gemery, MD; Brian S. Funaki, MD; Charles E. Ray, Jr, MD; Daniel B. Brown, MD; Thomas B. Kinney, MD; Jon K. Kostelic, MD; Jonathan M. Lorenz, MD; Steven F. Millward, MD; Albert A. Nemcek Jr, MD; Charles A. Owens, MD; Robert D. Reinhart, MD; James E. Silberzweig, MD; Gary P. Siskin, MD; George Vatakencherry, MD; Gregory L. Moneta, MD

## FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

## GUIDELINE STATUS

This is the current release of the guideline.

The appropriateness criteria are reviewed annually and updated by the panels as needed, depending on introduction of new and highly significant scientific evidence.

## GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

ACR Appropriateness Criteria® *Anytime*, *Anywhere*™ (PDA application). Available from the ACR Web site.

Print copies: Available from the American College of Radiology, 1891 Preston White Drive, Reston, VA 20191. Telephone: (703) 648-8900.

## AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACR Appropriateness Criteria®. Background and development. Reston (VA): American College of Radiology; 2 p. Electronic copies: Available in Portable Document Format (PDF) from the American College of Radiology (ACR) Web site.

## PATIENT RESOURCES

None available

## NGC STATUS

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Date Modified: 7/27/2009